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# Pesticide Fact Sheets Number 171: Karate

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**16. Abstract (Limit: 200 words)**

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

**17. Document Analysis a. Descriptors**

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

**b. Identifiers/Open-Ended Terms**

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EPA

# Pesticide Fact Sheet

Name of Chemical: KARATE (PP321)
Reason for Issuance: Conditional Registration
Date Issued: May 16, 1988
Fact Sheet Number: 171

## 1. DESCRIPTION OF CHEMICAL

Generic Name: PP321; [1 alpha(S), 3 alpha(Z)]-(+)-cyano-(3-phenoxyphenyl) methyl 3(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl-cyclopropanecarboxylate.
Common Name: PP321
Trade Name: KARATE
EPA Shaughnessy Code: 128867(a)
Chemical Abstracts Service (CAS) Numbers:
Year of Initial Registration: 1988
Pesticide Type: Insecticide
Chemical Family: Synthetic pyrethroid
U.S. Producers: ICI Americas, Inc.
Wilmington, DE 19897

## 2. USE PATTERNS AND FORMULATIONS

Application Sites: Agricultural use in/on Cotton

Method of Application: Foliar ground and aerial application

Formulation Types: 13% liquid (EC)

Application Rates: 0.01-0.03 lb.ai/Acre

Usual Carriers: Organic solvents; Surfactants

Limitations: RESTRICTED USE pesticide. Use limited to certified applicators or persons under their direct supervision.

## 3. SCIENCE FINDINGS

Summary Science Statement:

*PP321 comprises one of two diastereomers (enantiomeric pairs) of Cyhalothrin. Cyhalothrin consists of 4 cis isomers in the Z configuration (enantiomeric pair A & B) of which PP321 consists of 2 cis isomers (enantiomeric pair B).

Technical PP321 is a synthetic pyrethroid with moderate acute toxicity. The results of the acute toxicity on the end-use formulation indicates that product is of moderate to high acute toxicity. The end-use product is extremely irritating to the skin and is a mild sensitizer. Technical PP321 is not considered to be mutagenic or teratogenic in test animals. On the basis of structural considerations and metabolism and subchronic data on both PP321 and cyhalothrin, the Agency has accepted the long term data on cyhalothrin in partial fulfillment of the chronic toxicity requirements for PP321.

Sufficient data are available to characterize PP321 from an environmental fate and ecological effects standpoint. The results of acute toxicity studies indicate that PP321 is extremely toxic to fish and other aquatic organisms, but is practically non-toxic to waterfowl and upland game birds. However, reproduction data on mallards exposed to cyhalothrin domonstrated adverse effects on numbers of eggs laid at doses of 50 ppm, with a no-effect-level (NOEL) of 5 ppm cyhalothrin. Since technical PP321 is the more biologically active component of cyhalothrin, it may be more toxic; therefore, the Agency has determined that the repro reproduction study be repeated using technical PP321. An acute contact LD50 study indicated that PP321 is highly toxic to bees with an LD50 of 0.909 ug/bee. Formulated PP321 is also highly toxic to honey bees with a reported LD50 of 0.098 ug/bee and an oral LD50 of 0.483 ug/bee. PP321 is readily degraded by soil and is virtually insoluble in water. There is little or no potential for leaching.

The Agency has determined that the registration of PP321 may effect endangered aquatic and avian species. Pending a formal consultation with the Fish and Wildlife Service to determine use limitations with respect to these species, the product label contsists of language which will mitigate the risk to endangered species.

A Tolerance Assessment has been conducted by the Residue Chemistry Branch to provide a dietary exposure analysis for the use on cotton. The reference dose (Rfd) used to determine this dietary exposure is calculated to be 0.005 ppm based on a NOEL of 0.5 mg/kg/day from a 3-generation rat reproduction study and a safety factor of 100. The Theoretical Maximum Residue Contribution (TMRC) for the U. S. population is imately 2.6 % of the Average Daily Intake (ADI).

A. Chemical/Physical Characteristics of the Technical Material

Physical State: liquid
Color: light yellow
Odor: aromatic solvent odor at room temparature
Melting Point: not applicable
Vapor Pressure: 2.1 x 10-8 mbars
Density: 0.830 + .005 g/ml
Solubility: 0.002 mg/ml at 20°C in water
pH: 5.6
Octanol/Water Partition Coefficient: $4.2 \times 10^4$

B. Toxicological Characteristics:

(Technical PP321)

Acute Oral (Mouse): (LD50) males: 79 mg/kg females: 56 mg/kg — Toxicity Category II

Acute Dermal: (LD50) males: 632 mg/kg females: 696 mg/kg — Toxicity Category II

Primary Dermal Irritation (rabbit): PIS= 0 (none observed) — Toxicity Category IV

Skin Sensitization (guinea pig): not a sensitizer

Acute Inhalation: LD50 (4 hour) (end-use formulation) males: 0.315 mg/l females: 0.175 mg/l — Toxicity Category II

Teratology: (Cyhalothrin)
(rat) Maternal NOEL = 10 mg/kg/day
Maternal LEL = 15 mg/kg/day
Fetotoxic NOEL = 15 mg/kg/day
Teratogenic NOEL = not teratogenic
(rabbit) Maternal NOEL = 10mg/kg/day
Maternal NOEL = 30mg/kg/day
Fetotoxic NOEL = 15 mg/kg/day
Teratogenci NOEL = not teratogenic

2-Year Feeding/Oncogenicity: (Cyhalothrin)
(rat) Oncogenic NOEL = 2.5 mg/kg/day
Systemic NOEL = 0.5 mg/kg/day
(mouse) Oncogenic NOEL = 15 mg/kg/day

Gene Mutation (Ames): negative
Structural Chromosome Aberration: negative
In Vitro Cytogenetics Assay: negative

PP321 formulation- 13.1%

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| Acute Oral Toxicity in rats: | Toxicity Category II |
| LD50 = 64 mg/kg | |
| Acute Dermal Toxicity in rats: | Toxicity Category III |
| LD50 = >2000 ml/mg | |
| Acute Inhalation: | Toxicity Category II |
| LC50 = 0.315 mg/l(M); 0.175 mg/l(F) | |
| Primary Eye Irritation: | Toxicity Category II |
| Primary Dermal Irritation: | Toxicity Category I |
| PIS = 6.7 | |
| Dermal Sensitiztion: mild sensitizer | |

C. Physiological and Biological Characteristics

The mode of action in biological systems is stomach and contact exhibiting neuropathological characteristics typical of pyrethroid insecticides. Slight repellant effect.
Foliar absorption: N/A
Translocation: N/A

D. Environmental Characteristics

Adequate data are sufficient to define the fate of PP321 in the environment. PP321 is stable to photolysis at environmental pH and temperature. It photodegrades rapidly and is practically water insoluble. Under the conditions of the soil TLC test using various soils, (aged and unaged) PP321 residues are considered immobile in soils with a half-life of <14 days in silt and 28-56 days in clay loam, respectively. Anaerobic conditions did not alter either degradation rate or products. It has a bioaccumulation factor in fish of 858X. Residues are depurated radidly in untreated water. Accumulated residues are found in non-edible tissue. PP321 and its degradates do not leach into the soil. There are no concerns at this time in regard to ground water.

E. Ecological Characteristics

Avian Acute Oral: Mallard duck - LD50 > 3950 mg/kg
Avian Subacute Dietary: Mallard duck - LC50 3948 ppm
Bobwhite quail - LC50 > 5000 ppm
Freshwater Fish: Bluegill - LC50 = 0.21 ug/L
Rainbow Trout - LC50 = 0.24 ug/L
Freshwater Invertebrate: Daphnia magna LC50 = 0.36 ug/L
Marine/Estuarine Invertebrate: Mysid shrimp - LC50 = 4.9 ng/L
Eastern Oyster EC50 = 0.59 ng/L
Marine/Estuarine Fish: Sheepshead minnow - LC50 = 0.807 ng/L

4. Summary of Regulatory Position and Rationale

The Agency has determined that it should allow the conditional registration of PP321 for agricultural use to control insects in/on cotton. Adequate data are available to assess the acute and chronic toxicological effects of PP321 to humans. However since certain long-term fish, aquatic and avian data are missing and required, the registration is being conditionally approved with an expiration date of August 30, 1990 which coincides with the dates for submission of the data required to satisfy the remaining data gaps listed below.

In view of the high toxicity of technical PP321 to aquatic organisms (invertebrates and fish) and the potential hazard associated with exposure to this product, the Agency is concerned about exposure which may result from improper application or use and so is restricting use of this pesticide.

The Agency has determined that endangered species labeling restrictions are necessary to protect endangered species and is requiring specific limitations on use of this product to prevent or mitigate exposure.

5. Summary of Major Data Gaps

1. Avian Reproduction - Mallard (71-4)
   A final report is due in May, 1990.

2. Fish Life-Cycle (72-5)
   A final report is due in August, 1990.

3. Aquatic Invertebrate Lifecycle (72-4)
   A final report is due in August, 1989.

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